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A STUDY OF THE "SKIN TEST" WITH MENINGOCOCCUS TOXINS IN A GROUP OF BOYS [1] [2]

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INTRODUCTION

During the fall and winter of 1936–37, 6 cases of meningococcus meningitis, 3 of which were fatal, and 1 case of a low grade meningococcus septicemia occurred at the National Training School for Boys in the District of Columbia. In April 1937 the authors were given an opportunity to study the situation there.

The National Training School, on the outskirts of Washington, D. C., has an average enrollment of about 400 boys, including white and colored. Their ages range between 12 and 18 years, the majority of the boys being 15, 16, or 17 years of age. The average stay in the school is about 18 months, with an annual turn-over of about 150. The boys are housed in 7 "cottages," with about 60 in each, and they eat in a central dining hall. The 7 cases of meningococcus infection were distributed among 3 of the cottages. Only white boys were involved in this outbreak; colored boys showed no evidence of infection.

In an effort to identify the reservoirs of meningococcus infection at the school, studies were begun by making nose and throat cultures from the 4 convalescents who remained in the institution, and from 3 other boys who had been in close contact with the patients and who had lived in the 3 cottages involved. The technique used was that described in "Diagnostic Procedures and Reagents," published by the American Public Health Association (*1*). At the same time skin tests were made with meningococcus toxins supplied by Dr. N. S. Ferry (*2*). Five of these 7 boys were found to harbor meningococci, 4 carrying Group I and 1 Group II (a contact). One convalescent and 1 contact were negative. Several weeks later the cultures were repeated on the 5 boys who were still available. One convalescent remained positive.

[1] From the National Institute of Health and the Army Medical School.
[2] Submitted for publication April 24, 1941.

It has been observed (*3*) that the epidemic type of meningococcus infection is nearly always due to meningococci of Group I, whereas Group II strains are more commonly found in endemic cases. The one strain of Group II in this series was found in one of the contacts (J. E.) and it is therefore improbable that he had any relation to the outbreak; but seemingly identical Group I strains, from 3 convalescents and 1 contact, are probably significant. Unfortunately, the serological group of the strains from the active cases had not been determined; the cultures were not available at the time these studies were begun.

Table 1 summarizes this brief study and also gives the results of the skin tests with Ferry's toxin, which were performed at the same time.

TABLE 1.—*Study of nasopharyngeal cultures from convalescents and their contacts*

Name	Culture for meningococcus	Skin test reaction to toxin I	Skin test reaction to toxin II
Convalescents:	*Group*		
F. R.	Negative	Negative (8×8 [1])	Positive (15×12 [1]).
D. B.	Positive I	Negative (5×6)	Negative (8×10).
B. R.	Positive I	Negative (0×0)	Positive (10×15).
D. W.	Positive I	Negative (8×10)	Negative (8×10).
Contacts:			
C. L.	Negative	Negative (0×0)	Negative (0×0).
H. P.	Positive I	Positive (12×14)	Positive (14×14).
J. E.	Positive II	Positive (10×10)	Positive (10×10).

[1] Area of skin reaction in mm. Positive reaction=10×10 mm. or more.

The 4 convalescents were skin-test negative for the Group I toxin, and all except 1 were carrying Group I meningococci. Two of these convalescents were positive to the Group II toxin. Two of the contacts were skin-test positive for both toxins; 1 contact was negative throughout.

It was impracticable to make a carrier survey of the entire school or even of the cottages involved. Then, too, with the advent of spring weather, cases had ceased to occur. However, the opportunity seemed to be an excellent one to study the reaction to intracutaneous injections of meningococcus toxins in a group which recently had had an encounter with meningococcus meningitis. Should a positive skin reaction actually indicate susceptibility and a negative reaction following it in the same individual, after a series of injections, indicate immunity, this toxin might prove an agent of great value in controlling meningococcus infection during epidemic years.

Proof of the value of a skin test as a measure of susceptibility is not easy to acquire with a disease like epidemic meningitis in which outbreaks are explosive and rapid in course, and in which such low incidence of meningeal invasion is found during endemic periods. It seemed that a study of the skin test in a group such as that found in

the National Training School for Boys might yield data from which information could be gained if the next winter should bring another outbreak of meningococcus infection to this same group.

HISTORY

Skin tests with meningococcus culture filtrates were made in 1925 by Erlich, Popowski, and Przesmycki (*4*), and in 1927 by Herrold and Traut (*5*). They found that in about one-half of the individuals tested a zone of erythema and edema was produced.

In 1931, Ferry, Norton, and Steele (*2*) reported the presence of a soluble toxin in filtrates of certain strains of meningococci when cultivated by a special technique. Intradermal injections of dilutions of these filtrates gave skin reactions in a considerable number (approximately one-half) of their subjects. These authors themselves were the first to discuss the uncertainty of the significance of cutaneous reactions—whether a definite skin reaction indicated susceptibility to toxin or to meningococcus infection, or whether it was an indication of immunity. They found that positive or negative reactors persisted as such although there was a tendency for positive reactors to become gradually negative with repeated testing. Later they came to the conclusion that a positive skin reaction indicated susceptibility to the toxin in a manner analogous to that indicated by the Schick and Dick reactions. They based their opinion upon the following evidence: (*a*) Positive reactors became negative after a series of subcutaneous injections of undiluted toxin (*6*); and (*b*) positive skin reactions were partially neutralized by means of serum from horses immunized with the meningococcus toxins (*7*).

MATERIALS AND TECHNIQUE

Doctor Ferry generously kept us supplied with his standard diagnostic meningococcus toxins freshly titrated. His dosage and technique of performing and reading the skin tests were followed closely (*2*). Dilutions were made in 0.85 percent NaCl solution, and 0.1 cc. was injected intracutaneously—Group I toxin on the right forearm and Group II toxin on the left. The injections were made in the early or mid-afternoon.

Readings were made at about 8 o'clock on the following morning, and the size of the erythematous area, the intensity of color, and the amount of edema or infiltration were all recorded. Doctor Ferry's criterion of an area of erythema, 10 x 10 mm., was adopted as our own criterion of a positive reaction.

With the colored boys intense pigmentation of the skin sometimes masked the erythema. In such cases we had to depend upon the local edema, a very slight degree of which was conspicuous.

In some instances a fairly small and vivid central area of erythema was surrounded by a fainter and less well demarcated areola. Several persons who had previously had meningococcus meningitis gave very small and intensely red reactions. This raises the question as to whether or not we were dealing in these cases with an allergic state, a question which, of course, we are unable to answer.

RESULTS OF TESTING

Four hundred and ninety boys were tested at least once, 130 of them at least twice, and 42 of them three or four times. Table 2 shows the results obtained in the first testing of the entire school during the autumn of 1937, and of the newcomers in the early spring of 1938. It can be seen that over one-half of the total number of boys (52.7 percent for Group I and 67 percent for Group II) gave reactions regarded as positive with the toxins and that a larger number was positive to Group II toxin than to Group I. Analysis of this table shows a larger percentage of reactors among the colored boys.

TABLE 2.—*First testing of boys from National Training School*

Date	No. of boys tested			Positive to Group I						Positive to Group II					
				White		Colored		Total		White		Colored		Total	
	White	Colored	Total	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
September 22, 1937	56	45	101	21	37.5	21	46.6	42	41.5	30	53.6	36	80.0	66	65.3
September 29, 1937	3	100	103	3	100.0	80	80.0	83	81.0	2	66.7	80	80.0	82	79.6
October 20, 1937	111	3	114	40	38.1	0	0	40	35.1	70	63.1	1	33.3	71	62.3
November 3, 1937	61	22	83	28	46.0	11	50.0	39	47.0	32	52.5	16	72.7	48	57.8
April 6, 1938	----	53	53	----	-----	36	68.0	36	68.0	----	-----	37	69.8	37	69.8
April 15, 1938	81	2	83	42	51.9	1	50.0	43	51.8	56	69.1	0	0	56	67.5
Total	312	225	537	134	42.3	149	66.2	283	52.7	190	61.0	170	76.0	360	67.0

One hundred and thirty white boys were tested more than once. The first tests were made during a 6-week period beginning September 22. Fifty-two of these boys received the second tests on March 23, approximately 6 months after the first. The same result was obtained in 70 percent of them, and was practically the same with both test toxins. The shift from positive to negative, and from negative to positive, occurred approximately an equal number of times, i. e., positive to negative with toxin I, 7 times, toxin II, 8 times; from negative to positive with toxin I, 7 times, toxin II, 8 times.

Other boys were retested at varying intervals. Table 3 shows the results in 21 boys tested four times with Group I toxin. Although

the numbers are much too small to serve as the basis for a conclusive statement, there will be noted, in the case of most of these boys, an apparent tendency for positive reactors to become negative after repeated testing. Of the 10 boys who gave positive reactions with Group I toxin when tested in September, 8 gave smaller reactions upon subsequent testing, finally showing negative, 5 as early as the second injection. On the other hand, 6 of 11 boys who were negative to toxin I in September became positive in March, while 3 of the other 5 negative boys gave increased reactions in March, although their reactions were still smaller than the arbitrarily chosen 10 x 10 mm. area. Four of the 6 March reactors were again negative in April and remained so in July, i. e., boys Nos. 15, 36, 43, and 47. It may be seen from the percentages reported in table 3 that 47.6 percent of the boys were positive in September and 52.4 percent positive in March, but that this rate had dropped to 42.9 percent in April, and to 19.0 percent in July. The reaction in 4 boys, Nos. 14, 17, 21, and 42, remained the same throughout.

TABLE 3.—*Repeated testing with Group I toxin*

Subject tested	Dates of testing			
	Sept. 22, 1937	Mar. 23, 1938	Apr. 15, 1938	July 11, 1938
	Area of reaction in millimeters			
1	18×25 (+)	9×10 (0)	9×10 (0)	8×8 (0)
3	12×25 (+)	9×9 (0)	9×10 (0)	0×0 (0)
5	9×12 (+)	7×8 (0)	6×9 (0)	5×6 (0)
7	11×14 (+)	6×10 (0)	12×11 (+)	5×5 (0)
11	20×70 (+)	15×21 (+)	14×13 (+)	0×0 (0)
14	11×12 (+)	10×23 (+)	12×11 (+)	10×12 (+)
15	0×0 (0)	14×18 (+)	8×10 (0)	6×6 (0)
16	5×6 (0)	7×8 (0)	5×7 (0)	11×11 (+)
17	6×6 (0)	7×10 (0)	5×6 (0)	8×7 (0)
18	12×14 (+)	8×10 (0)	10×9 (0)	2×2 (0)
21	13×20 (+)	15×15 (+)	12×15 (+)	10×12 (+)
33	0×0 (0)	12×20 (+)	12×14 (+)	7×7 (0)
36	6×7 (0)	15×22 (+)	9×9 (0)	9×10 (0)
40	11×11 (+)	10×14 (+)	11×11 (+)	10×7 (0)
42	5×9 (0)	9×9 (0)	8×10 (0)	8×8 (0)
43	0×0 (0)	10×12 (+)	7×9 (0)	8×9 (0)
45	7×9 (0)	0×0 (0)	11×12 (+)	6×8 (0)
47	0×0 (0)	10×12 (+)	9×9 (0)	8×10 (0)
53	0×0 (0)	16×21 (+)	9×12 (+)	5×10 (0)
54	10×12 (+)	11×13 (+)	12×15 (+)	2×2 (0)
55	9×9 (0)	9×9 (0)	8×10 (0)	13×11 (+)
Percent positive	47.6	52.4	42.9	19.0

Table 4 shows that the reaction to toxin II was similar but less regular. Of the 9 boys who gave a positive reaction with toxin II on the first testing, 2 gave progressively smaller reactions with each subsequent test, becoming completely negative. Fifteen showed a higher reactivity during March or April. By July only 1 of these 21 boys was positive to toxin II.

TABLE 4.—*Repeated testing with Group II toxin*

Subject tested	Dates of testing			
	Sept. 22, 1937	Mar. 23, 1938	Apr. 15, 1938	July 11, 1938
	Area of reaction in millimeters			
1	20×32 (+)	15×17 (+)	9×10 (0)	0×0 (0)
3	13×15 (+)	6×7 (0)	12×11 (+)	0×0 (0)
5	10×12 (+)	8×10 (0)	11×13 (+)	0×0 (0)
7	10×14 (+)	12×15 (+)	10×12 (+)	0×0 (0)
11	17×30 (+)	8×10 (0)	13×15 (+)	10×10 (+)
14	6×8 (0)	6×8 (0)	11×12 (+)	6×9 (0)
15	0×0 (0)	12×14 (+)	11×11 (+)	0×0 (0)
16	0×0 (0)	15×13 (+)	11×16 (+)	0×0 (0)
17	5×6 (0)	3×5 (0)		4×4 (0)
18	13×13 (+)	10×10 (+)	6×5 (0)	2×2 (0)
21	5×8 (0)	30×32 (+)	11×16 (+)	0×0 (0)
33	15×18 (+)	8×9 (0)	15×22 (+)	7×7 (0)
36	16×19 (+)	18×21 (+)	13×7 (+)	0×0 (0)
40	7×10 (0)	10×13 (+)	17×23 (+)	0×0 (0)
42	9×8 (0)	7×10 (0)	12×11 (+)	0×0 (0)
43	0×0 (0)	8×15 (+)	8×10 (0)	0×0 (0)
45	12×16 (+)	8×10 (0)	10×12 (+)	0×0 (0)
47	7×8 (0)	5×7 (0)	12×13 (+)	0×0 (0)
53	3×5 (0)	8×10 (0)	12×10 (+)	0×0 (0)
54	0×0 (0)	11×15 (+)	19×26 (+)	2×2 (0)
55	3×5 (0)	8×10 (0)	12×10 (+)	0×0 (0)
Percent positive	42.9	47.6	80.9	4.8

The apparent increasing susceptibility from September through March and April, with a dropping off by the time of the July tests may indicate seasonal differences in the skin connected with its function as part of the temperature regulating mechanism. Likewise there are many problems concerned with the mechanism of the allergic state which complicate all such studies. We feel that the figures should be reported without an attempt at explanation.

DISCUSSION AND SUMMARY

At the time this work was started, there was some reason to think that we had an excellent opportunity for ascertaining the value or significance of skin tests in determining susceptibility to meningococcus infection. Here was a self-contained institution with 400 inmates, each one in residence for a period of about 18 months. Meningococcus meningitis had appeared in the institution and carriers were still present. It would not have been surprising if more cases had occurred; still more might have been expected to occur during the following winter. As a matter of fact there have been no more cases.

It was felt that if we tested all the boys when in residence and continued periodically to test new arrivals data would be available upon which evaluation of the test could be made, should any cases of meningococcus meningitis occur. It was when we returned to test new arrivals that it occurred to us to reinject some of the boys already tested; the irregular results suggested further repetition. We are

therefore not attempting to offer an explanation; a great deal more work is needed before deductions of any kind can be made. The interesting possibility of a seasonal variation in skin reactivity is suggested by some of the results.

We did not have an opportunity to relate the reactions to the susceptibility of individuals to specific meningitis; we made preparations for an outbreak which did not occur. Until advantage can be taken of such a sequence of events, the value of these skin tests in ascertaining susceptibility to meningococcus infection cannot be appraised.

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STUDIES ON BACTERICIDAL AND PHAGOCYTIC ACTIVITY OF NORMAL HUMAN BLOOD ON MENINGOCOCCI IN RELATION TO THE "SKIN TEST" WITH MENINGOCOCCUS TOXINS [1]

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HISTORY

In the preceding paper (*1*) the authors reported studies on the local reaction produced by the intracutaneous injection of meningococcus culture filtrate in a group of boys ranging in age from 12 to 18 years. Proof of any relationship between the reactions elicited and immunity or susceptibility to meningococcus infection was not forthcoming because no cases of meningitis developed in the group subsequent to the testing. It seemed that additional information might be obtained by comparing these reactions with other immunological phenomena in the same individuals.

As early as 1905 Davis (*2*) noted the bactericidal action of human blood upon meningococci. He found considerable individual varia-

[1] From the National Institute of Health and the Army Medical School.
[2] Submitted for publication April 24, 1941.

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tion in this respect among normal people and noted the marked bactericidal action of the blood of three persons convalescing from meningococcus meningitis. This was before serum therapy had been introduced. He suggested a relation between bactericidal action and immunity to meningococcus infection.

Matsunami and Kolmer (*3*), in 1918, studied the bactericidal action of the blood of man, rabbits, guinea pigs, and mice. They found that the bactericidal activity seemed to be related to a species resistance to meningococcus infection, i. e., the blood of rabbits was most bactericidal, whereas rabbits were most resistant; that of mice least bactericidal. The blood of man was less bactericidal than that of rabbits and more like that of mice and of young guinea pigs. Blood from young children was less bactericidal than that from adults. There was much individual variation in this respect among human beings. These authors interpreted their findings as evidence that bactericidal action and resistance to the meningococcus occur together.

Heist and his co-workers (*4*), in 1922, studied the bactericidal action of the whole blood of 172 young men. They found that recently isolated spinal fluid strains multiplied in the blood more readily than carrier strains and that the bactericidal property of blood varied widely. They believed that bactericidal action was a measure of resistance.

Silverthorne and Fraser (*5*), in a study of 50 samples of human blood, found those from most adults bactericidal for meningococci to a high degree, whereas those from most infants were not. They found that the blood of two infants which was originally not bactericidal became definitely so after therapeutic serum was given, whereas the blood of another became bactericidal after an attack of meningococcus meningitis. They found virulent newly isolated cultures to be less readily killed than older ones. They studied the blood of guinea pigs before and after vaccination (*6*) with new spinal fluid strains of meningococci and found that marked bactericidal action developed in the vaccinated animals. They found (*7*) that mouse virulent strains of meningococci survived and multiplied in nonbactericidal blood, whereas those that were nonvirulent for mice did not do this.

Later, Silverthorne (*8*) made further studies with vaccinated and unvaccinated guinea pigs and also with a group of vaccinated babies. He interpreted his findings as evidence that the bactericidal property of blood and immunity to meningococcus infection are related.

BACTERIAL TESTS

It seemed to us that an attempt to correlate the "skin test" reactions of the boys we had studied with the bactericidal activity of their blood

might yield information of value concerning susceptibility and resistance to meningococcus infection.

Fifty boys were included in the study. All of these had been given "skin tests" with Group I and Group II meningococcus toxins more than once, most of them three and four times. These tests have been discussed in the preceding paper (*1*). Positive and negative subjects were chosen for the present investigation. The intracutaneous reactions were studied during the period from September 1937 to July 1938; determination of the bactericidal activity of the blood was made from June to December 1938.

Samples of blood were collected and handled as follows: Nine cc. of venous blood was drawn into a syringe containing 1 cc. of 10 percent sodium citrate. The bleedings were taken before breakfast. Four samples were included in each experiment. The tubes of citrated blood were packed in ice and transported at once to the National Institute of Health laboratory where they were kept on ice until the tests were set up, at about 1 p. m.

Eighteen strains of meningococci were used, 9 of Group I and 9 of Group II. One (1112–II) was from a current case of meningococcus septicemia at Walter Reed Hospital; 2 (1027–I and 963–II) were strains that were used routinely for evaluating therapeutic sera by the mouse protection method and were maintained in the laboratory at maximum virulence for mice; 13 were recently isolated strains that had been stored in a lyophile state while of high virulence; 2 (331–I and 173–II) were old stock strains representing the Gordon-Murray Types I and II. These 18 cultures were transferred daily on rabbit blood agar and tested for virulence in mice from time to time. Five-hour blood agar slant cultures were used for the tests.

In setting up the tests the technique described by Silverthorne (*8*) was followed with a few slight modifications. Ordinary agglutination tubes were used, plugged with cotton and sterilized by heat. The amount of whole citrated blood placed in each tube was 0.2 cc. Six dilutions of each culture were used with every blood sample. A suspension of a 5-hour culture of each strain to be used was made in a meat infusion-peptone broth and diluted by comparison of its turbidity with silica standards so that the average dilution corresponding with 1,000 parts per million of silica contained about 2,000,000,000 meningococci per cubic centimeter. From this starting point 6 further tenfold dilutions in broth were made; dilution 10^{-1} contained approximately 200,000,000 and 10^{-6} contained 2,000 meningococci per cubic centimeter. The amount of culture added to each tube was 0.02 cc., making the number of meningoccoci added to the whole blood range from 4,000,000 to 40. A loopful of each of the two highest broth dilutions of each strain was plated out on blood agar to get an idea of numbers and viability of organisms present at the time the test was

set up, and all dilutions were incubated overnight and examined for growth and purity the next day.

A series of tubes in which the blood was replaced by broth was set up to act as a control of the viability and multiplication of the microorganisms under the conditions of the experiment. The tubes containing the whole blood and culture dilutions, as well as the "control" set, were well shaken and incubated in a water bath at 37° C. The same platinum loop was used for this purpose throughout the studies. Eight tubes were inoculated on each blood agar plate. Results were recorded as 0, 1+, 2+, 3+, and 4+, although fewer than five colonies were recorded by number; 4+ indicated confluent growth.

Among the 50 boys studied, all were tested at least twice; 23 were tested 3 times, and 4 were tested 4 times. The results were constant.

In accord with the experience of previous workers, we found virulence to be an important factor. In table 1 the virulence of 16 strains at the time of the experiments is expressed in the extreme right-hand column by the dilution of the culture (1 cc.) required to kill a 16–20 gram mouse in 48 hours. Maximum virulence is represented by dilution 10^{-9} (2–10 meningococci). Three strains of lower virulence were markedly inhibited by all samples of blood. These were: 173, of virulence 10^{-4} (200,000 meningococci per cubic centimeter), 933, of virulence 10^{-5} (20,000 meningococci per cubic centimeter), and 331, of virulence 10^{-6} (2,000 meningococci). Strain 933 did not grow in the blood from any of the 50 boys studied. This relation of virulence and bactericidal action was found with all of the 50 blood samples studied. When a strain that had been growing in all samples suddenly began to be killed in the tests, the virulence for mice was invariably found to be decreased.

Even more conspicuous than this greater susceptibility of less virulent strains to bactericidal action was an individual difference among the very virulent strains of meningococci in their ability to survive and multiply in blood. Certain strains of high virulence, as measured in mice, were regularly much more easily destroyed by whole human blood than others. In table 2 may be seen the action of 22 bloods on 4 strains of meningococci which were all of maximum virulence for mice at the time of the tests. Group I strain 1041 was completely destroyed by 14 of the bloods in all dilutions used and in others survived only in those tubes given an inoculum of 2,000,000 to 20,000,000 microorganisms. The only blood in which there was no evidence of bactericidal action for this spinal fluid strain was No. 15. This blood showed no bactericidal properties for any strain. A contrast to strain 1041 is found in Group II strain 1112 which had been recovered from the blood of a fatal case of meningococcus septicemia. This strain grew well in nearly all bloods tested. Definite bactericidal action for strain 1112 was seen in only 4 bloods but these also showed

TABLE 1.—*Bactericidal action of blood from 5 boys upon 16 strains of meningococci, skin reaction of these boys to meningococcus, virulence of the meningococci for mice*

Skin reaction to control toxin (July 1938): I / II	No. 18				No. 22				No. 7				No. 11				No. 9				Mouse virulence of the strains studied
	Bactericidal action on meningococci																				
	Negative Negative				Positive Positive				Negative Negative				Negative Positive				Negative Negative				
	Dilutions of the test cultures																				
	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	
Test strain used																					
Group II:																					
173	1+	1+	[1]0	0	2+	1+	1+	1+	1+	0	0	0	0	0	0	0	1+	0	0	0	10^{-4}
933	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10^{-4}
964	4+	4+	4+	4+	4+	4+	4+	3+	4+	4+	4+	4+	4+	4+	4+	4+	3+	3+	0	0	10^{-4}
1054	1+	0	0	0	4+	1+	1+	0	0	0	0	0	1+	0	0	0	4+	3+	1+	1+	10^{-4}
1087	0	0	0	0	4+	4+	4+	3+	3+	3+	0	0	3+	2+	1+	1+	3+	2+	1+	1+	10^{-4}
1108	3+	0	0	0	3+	1+	1+	0	0	0	0	0	0	0	0	0	2+	2+	0	0	10^{-4}
1112	2+	1+	1+	0	3+	3+	3+	3+	3+	3+	3+	2+	3+	2+	2+	0	2+	1+	0	0	10^{-3}
Group I:																					
331	1+	0	0	0	1+	1+	0	0	2+	0	0	0	2+	1+	0	0	0	0	0	0	10^{-4}
973	4+	4+	4+	4+	4+	4+	4+	4+	3+	2+	1+	0	0	0	0	0	2+	1+	0	0	10^{-3}
1004	4+	4+	4+	4+	4+	4+	4+	4+	4+	3+	3+	3+	3+	1+	1+	0	4+	4+	4+	3+	10^{-3}
1010	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	3+	4+	4+	4+	4+	0	0	0	0	10^{-3}
1027	4+	4+	4+	4+	4+	4+	4+	4+	2+	2+	2+	0	0	0	0	0	0	0	0	0	10^{-3}
1037	3+	3+	1+	1+	4+	4+	4+	1+	1+	0	0	0	0	0	0	0	1+	1+	0	0	10^{-3}
1038	4+	4+	3+	3+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	3+	3+	1+	1+	10^{-3}
1041	0	0	0	0	3+	2+	2+	1+	0	0	0	0	1+	1	0	0	0	0	0	0	10^{-3}
1046	4+	2+	2+	2+	4+	3+	3+	2+	4+	4+	4+	3+	4+	4+	4+	4+	0	0	0	0	10^{-3}

[1] 0 indicates no growth. Figures 1 to 4 indicate degrees of growth (4 indicates confluent growth).

marked inhibitory properties for all other strains studied. Group II strain 1087 from spinal fluid of a fatal case was also relatively resistant to bactericidal action, behaving very much like strain 1112, whereas Group I strain 1027 was destroyed more frequently, though it was less susceptible than Group I strain 1041. This apparently greater susceptibility of Group I meningococci is not a constant but merely a chance occurrence related to those strains selected for this study.

TABLE 2.—*Bactericidal action of the blood from 22 boys upon meningococci and the response of these boys to intracutaneous injection*

Blood sample	Skin test reaction		Strain 1027 (I)				Strain 1112 (II)				Strain 1041 (I)				Strain 1087 (II)			
	I	II	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
1	−	−	2+	1+	1+	1+	3+	3+	3+	2+	0	0	0	0	4+	4+	4+	4+
2	+	+	1+	1+	0	0	4+	4+	3+	2+	0	0	0	0	1+	1+	1+	1+
3	−	−	1+	0	0	0	4+	4+	3+	2+	0	0	0	0	4+	4+	4+	4+
4	+	+	1+	1+	1+	1+	4+	4+	3+	3+	0	0	0	0	4+	4+	4+	4+
5	−	+	3+	3+	2+	0	3+	3+	3+	1+	3+	2+	0	0	3+	3+	2+	0
6	+	+	4+	4+	4+	3+	4+	4+	2+	2+	0	0	0	0	3+	0	0	0
7	−	−	2+	2+	2+	0	3+	3+	3+	2+	0	0	0	0	3+	3+	0	0
8	+	+	3+	2+	2+	0	3+	3+	3+	2+	0	0	0	0	3+	3+	0	0
9	−	−	0	0	0	0	2+	1+	0	0	0	0	0	0	3+	2+	1+	1+
11	−	+	0	0	0	0	3+	2+	2+	0	1+	1+	0	0	3+	2+	1+	1+
12	+	+	3+	2+	1+	1+	3+	3+	3+	2+	4+	0	0	0	4+	4+	4+	3+
13	+	+	4+	4+	4+	1+	4+	4+	4+	4+	0	0	0	0	4+	4+	4+	4+
14	+	−	0	0	0	0	4+	4+	4+	4+	3+	2+	1+	1+	4+	4+	4+	4+
15	−	+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+	4+
16	−	−	1+	1+	0	0	3+	2+	1+	0	0	0	0	0	3+	3+	2+	1+
17	−	−	1+	1+	0	0	3+	2+	0	0	0	0	0	0	2+	2+	1+	0
18	−	−	4+	4+	4+	4+	2+	1+	1+	0	0	0	0	0	0	0	0	0
19	+	+	1+	0	0	0	0	0	0	0	1+	0	0	0	3+	3+	0	0
21	+	+	4+	4+	4+	3+	3+	3+	3+	3+	2+	0	0	0	4+	4+	4+	4+
23	−	−	4+	4+	4+	4+	4+	4+	4+	4+	0	0	0	0	4+	3+	2+	2+
29	+	+	1+	1+	0	0	3+	2+	0	0	0	0	0	0	0	0	0	0
30	+	+	0	0	0	0	4+	4+	4+	2+	1+	0	0	0	3+	3	0	0

Besides this difference in behavior of individual strains, it can be seen in table 2 that the blood of some boys was definitely and consistently more bactericidal for all meningococci than was that of others; e. g., No. 15 seemed entirely devoid of bactericidal power under the conditions of the experiments, whereas Nos. 17 and 19 had marked bactericidal action.

It is impossible to present in complete detail all the data obtained in these studies since each person and strain tested reacted in an individual way. Representative cases have been chosen to illustrate the points in question. Further reference to table 1 shows more evidence of individual differences in both the bactericidal activity of the blood samples and in the susceptibility of the strains of meningococci. The bloods from Nos. 9 and 11 were markedly bactericidal for most strains, and that from No. 7 relatively so. Blood from No. 18 was chiefly bactericidal for Group II strains, whereas that from No. 22 showed practically no bactericidal action for either Group. Such results occurred regularly through many repetitions of the tests.

A difference in the resistance of individual strains of meningococci to bactericidal action is also seen in table 1. Strains 1004, 1038, 964,

and 1112 grew moderately well in all samples of blood; strains 1054, 1108, 1037, and 1041 were easily inhibited. Strains 1010 and 1046 were killed by only one sample of blood. All degrees of susceptibility to bactericidal action can be found. Just as many strains of Group II as of Group I were sensitive to bactericidal action. Serological grouping, in itself, does not seem to be a factor in susceptibility.

Greater bactericidal action in some individuals has been interpreted by earlier workers as an indication of resistance to meningococcus infection (*2, 3, 4, 5, 6, 8*). What kind of response do these individuals give to intracutaneous injection of meningococcus toxins? Is there any correlation between the "skin-test" reactions and the bactericidal activity of the blood?

In table 1 the skin-test reactions are included, expressed as positive or negative. A positive reaction indicates a zone of erythema at least 10 by 10 mm. in diameter. The technique of performing and of reading the test has been described in a preceding paper (*1*). Table 1 shows that blood from Nos. 7 and 9, who were skin-test negative to both toxins, was definitely more bactericidal than that from No. 22, who was skin-test positive to both toxins. The blood of No. 18 was much more bactericidal for Group II meningococci than for Group I, whereas this individual was skin-test negative for both Group II and Group I toxins. On the other hand, the blood of No. 11 was as bactericidal for both groups as any other blood shown in the table, yet this boy was skin-test positive with only Group II toxin.

In table 2 the reactions to intracutaneous injections of Group I and Group II toxins are, likewise, included. In some instances negative skin reactions and bactericidal activity were in agreement, i. e., Nos. 9, 16, 17, and 18. With Nos. 5 and 11 a negative reaction with Group I toxin only was associated with bactericidal activity for that Group only. On the other hand Nos. 19, 29, and 30 seemed to be equally bactericidal, although the skin reactions were positive at that time. Nos. 1, 2, 3, and 4 were very similar in bactericidal action, although 1 and 3 were skin-test negative and 2 and 4 were skin-test positive.

Table 3 summarizes the results obtained from the remainder of the 50 boys. Since so many strains of meningococci of varying degrees of sensitiveness were used, bactericidal action, recorded in the extreme right-hand column, is expressed in general terms, such as slight, moderate, none, etc. Six of the positive skin reactors showed no bactericidal action, 7 others exhibited slight or moderate action, while 7 negative reactors gave no bactericidal action, and 6 others gave slight to moderate effects. Thus in only about one-half of the subjects studied did a negative skin reaction correlate with bactericidal action.

TABLE 3.—*Summary of phagocytic activity and bactericidal action of blood from 29 boys, and of their reaction to intracutaneous injection of meningococcus toxins*

Blood sample	Percentage of leucocytes containing meningococci					Skin test reactions		Bactericidal action
	I		II			I	II	
	1027	1041	1112	1087	963			
24	4	4	8	20	-------	−	−	Slight.
25	0	4	4	0	-------	−	−	None.
26	0	12	4	12	-------	−	−	Slight.
27	4	0	12	0	-------	+	+	Moderate.
28	0	8	20	-------	4	+	+	Slight.
29	0	8	20	-------	0	+	−	Moderate.
30	0	8	20	-------	0	+	+	Slight.
31	4	12	32	-------	8	+	−	Inhibited I.
32	0	0	-------	0	8	+	+	Moderate.
33	0	4	-------	0	4	+	+	None.
34	0	0	-------	0	0	+	+	Slight.
35	0	0	-------	4	0	+	+	None.
36	0	0	-------	0	8	−	−	Moderate.
37	[1]0	[1]12	-------	[1]0	[1]4	−	+	Do.
38	8	12	-------	0	12	−	−	None.
39	0	8	-------	[1]0	16	+	+	Moderate.
40	0	4	4	4	-------	+	+	None.
41	0	0	0	4	-------	+	+	Do.
42	4	12	20	8	-------	−	−	Moderate.
43	4	12	32	0	-------	−	−	None.
44	16	8	-------	0	8	+	+	Do.
45	8	0	-------	4	8	−	−	Do.
46	4	0	-------	12	0	−	−	Slight.
47	0	4	-------	0	0	−	−	Do.
48	0	4	-------	4	8	+	+	None.
49	4	0	-------	[1]8	4	−	−	Do.
50	[1]0	4	-------	0	4	−	−	Do.
51	4	4	-------	16	0	+	+	Moderate.
52	8	8	-------	0	4	−	−	None.

[1] Large mononuclears actively phagocytic also.

PHAGOCYTIC STUDIES

Early in the course of these studies it occurred to us that bactericidal activity in the blood might be correlated with phagocytic action and that simultaneous observations of these two immunological phenomena on meningococci, and of skin reactions to meningococcus toxins, might give information about their significance.

Thirty of the samples of whole citrated blood were also examined for phagocytic action, using 12 strains of meningococci. The technique used was a modification of that used by Evans (*9*) for the opsonocytophagic test in her studies of chronic brucellosis.

In the bactericidal tests, as described above, the whole blood was used, 0.2 cc. in each tube, and 0.02 cc. of various dilutions of the cultures 10^{-1} to 10^{-6} were added, and the mixtures shaken thoroughly. After 2 hours' incubation in a water bath at 37° C. the tubes containing the 10^{-1} dilution of culture were removed. A small amount of material was removed from each, using finely drawn capillary pipettes. A large drop was placed near one end of a clean glass slide and spread thickly by dragging the drop along the slide by means of another slide held at an angle. The preparations were air dried, the red cells dissolved by immersing the slides in a solution of 1-percent acetic

acid in 5-percent formalin, and the smear then stained with Bordet-Gengou's carbol toluidin blue.[2] The stain remained on for 30 to 60 seconds and was then rinsed off.

Evans' method of reading the slides was used as a guide. Twenty-five polymorphonuclear leucocytes, chosen from several well-separated areas, were examined and recorded as positive or negative. Percentages could be obtained by multiplying the number of positive or negative cells by 4.

The amount of phagocytosis found in 29 samples of blood for 5 strains of meningococci is recorded in table 3. These samples came from normal boys and the degree of phagocytosis demonstrable would not be expected to be great. It is interesting to note the variation in the different samples of blood in this respect; Nos. 31 and 43 showed 32 percent of the leucocytes with ingested meningococci of strain 1112, whereas No. 34 showed no sign of phagocytosis with any strain. Strain 1112 was more frequently taken up by the leucocytes than any other. Strain 1027 was least frequently phagocyted. In some samples the phagocytosis was negligible, in others slight but definite. In none was it comparable to that obtained by using the blood of immunized rabbits with the strains included in this study.

The large monocytes were quite active in phagocytosis in several samples of blood (i. e., Nos. 37, 39, 49, and 50), although the polymorphonuclear leucocytes were relatively inactive. This phenomenon was especially conspicuous in No. 37.

Examination of table 3 will show no regular correlation between phagocytosis and either skin reactions or bactericidal activity. There were some samples in which relatively active phagocytosis was associated with negative skin reactions, i. e., Nos. 42, 43, 38, and 24; there were others where such phagocytic activity occurred with markedly positive skin reactions, i. e., Nos. 28, 31, and 51. In all of these the bactericidal action varied.

DISCUSSION AND SUMMARY

Samples of blood from individual boys varied considerably in bactericidal action upon meningococci. Equally conspicuous was the variation in susceptibility to bactericidal action among the different strains of meningococci. One factor in this variation was virulence; nonvirulent strains were destroyed much more easily than virulent ones. However, even among strains that were of maximum virulence for mice, there was a marked difference in bactericidal action. This may be due to variations in virulence other than that which can be measured in mice. Apparently, there was something inherent in the

[2] This was made by dissolving 5 grams toluidin blue in 100 cc. alcohol, 500 cc. distilled water, and 500 cc. of 5 percent phenol. One part of this was diluted with 2 parts distilled water for use.

individual strains of meningococci, which played an important role in their susceptibility to the defensive mechanism in the blood. Serological group did not seem to play a role of importance. Silverthorne (*10*) and his co-workers think response to bactericidal action may be a truer measure of virulence for man than pathogenicity for mice.

There was no actual correlation between the bactericidal activity of the blood and the response of the boy to an intracutaneous injection of meningococcus toxin. Negative skin reactions and high bactericidal activity occurred together in approximately the same number of instances as positive skin reactions and bactericidal activity. Both positive and negative skin reactions occurred an equal number of times with low bactericidal activity.

Phagocytic activity varied with the different bloods. Some strains of meningococci seemed more easily taken up by leucocytes than others, and this property did not seem to depend entirely upon virulence of the microorganism as measured in mice. Even at best, phagocytosis was slight, not more than 32 percent of the leucocytes engulfing meningococci in any case. In some samples of blood there was practically no evidence of phagocytic activity. There was no regular correlation between such phagocytosis as occurred and either bactericidal action or skin reaction.

Findings may be summarized as follows:

(1) At least one-half of all boys tested gave a positive skin reaction to meningococcus toxins.

(2) The blood of about one-half of the boys showed marked bactericidal activity for meningococci.

(3) Phagocytosis of meningococci by the leucocytes in blood from normal boys was never very pronounced and varied from 0 to 32 percent.

(4) There was no correlation between the three phenomena studied.

(5) Individual strains of meningococci varied greatly in their response to bactericidal and phagocytic activity.

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

May 24–June 20, 1942

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended June 20, 1942, the number reported for the corresponding period in 1941, and the median number for the years 1937–41.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—While the number of cases (2,809) of influenza reported for the 4 weeks ended June 20 was less than one-half of the number reported for the corresponding period in 1941, it was slightly higher than the 1937–41 median incidence for this period. A few more cases than might normally be expected were reported in the New England, West North Central, and Mountain regions, but in all other regions the incidence was below the preceding 5-year average incidence.

Measles.—The incidence of measles was less than 60 percent of the incidence recorded for the corresponding period in 1941, but the number of cases (approximately 63,000 cases) was about 1.3 times the average incidence for the years 1937–41. The disease was most prevalent in the West North Central, Mountain, and Pacific regions, with minor excesses over the seasonal expectancy in the New England and West North Central regions. During this period in 1941 this disease was most prevalent in the Middle Atlantic, East North Central, and South Atlantic regions; the current incidence in those regions was relatively low.

Meningococcus meningitis.—For the current period there were 288 cases of meningococcus meningitis reported, the number being about 1.9 times the incidence during the corresponding period in 1941, which figure (152 cases) also represents the 1937–41 average incidence for

this period. Each section of the country except the East South Central reported an excess of cases over the 1937–41 median figures. The current incidence, however, represented a 30-percent decrease from the number of cases reported during the preceding 4-week period and a further decline may be expected. Apparently the highest seasonal incidence was reached during the preceding 4-week period when 390 cases were reported, which was the highest incidence recorded for a 4-week period since 1937; during that year 690 cases were reported during the period corresponding to the one under consideration, and 772 cases were reported for the preceding 4-week period.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended June 20 there were 612 cases of diphtheria reported, as compared with 767 in the corresponding period in 1941 and a median of 1,022 cases in the years 1937–41. The situation was favorable in all sections of the country, each region reporting a lower incidence than might normally be expected.

Poliomyelitis.—The number of cases (97) of poliomyelitis was about 90 percent of the number reported in 1941 and only about 60 percent of the average seasonal incidence. The incidence was slightly above normal in the North Atlantic, West North Central, West South Central, and Mountain regions, about normal in the South Atlantic and East South Central regions, and relatively low in the East North Central and Pacific regions. The current figure represented an increase over the preceding 4-week period of about 35 percent, but there was nothing to indicate more than the normal increase of this disease that is expected at this season of the year.

Scarlet fever.—This disease still maintained an unusually low level, the number of cases (7,503) reported being the lowest on record for this period. The New England and East South Central regions reported slight excesses over the normal seasonal incidence but in all other regions the incidence was comparatively low.

Smallpox.—For the current period there were 105 cases of smallpox reported, as compared with 144, 243, and 1,057 for the corresponding period in 1941, 1940, and 1939, respectively. The number of cases was the lowest on record for this period. The most significant decreases were reported from the North Central and Pacific regions.

Typhoid and paratyphoid fever.—The number of cases of typhoid fever was also comparatively low, the number (457) being approximately 90 percent of the 1941 figure and less than 60 percent of the average seasonal incidence (804 cases). Very definite decreases were reported from all regions except the Middle Atlantic.

Whooping cough.—Approximately 15,000 cases of whooping cough were reported, as compared with 19,179 reported cases in 1941 and

an average of 16,058 cases in the years 1939–41. The disease was most prevalent in the North Atlantic and East North Central regions with a minor increase in the East South Central region; all other regions reported a decline in the number of cases.

MORTALITY, ALL CAUSES

The death rate from all causes in large cities was about normal. For the 4 weeks ended June 20 the average rate, based on data received from the Bureau of the Census, was 11.0 per 1,000 inhabitants (annual basis). The rate for the corresponding period in 1941 was 10.9, and the average rate for the years 1939–41 was 11.0.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period May 24–June 20, 1942, the number for the corresponding period in 1941, and the median number of cases reported for the corresponding period, 1937–41

Division	Current period	1941	5-year median	Current period	1941	5-year median	Current period	1941	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	612	767	1,022	2,809	5,649	2,685	62,904	111,273	48,249
New England	20	13	22	14	6	6	6,994	6,472	6,472
Middle Atlantic	87	140	208	27	23	36	9,869	37,913	18,292
East North Central	131	143	213	226	197	258	8,748	29,395	12,999
West North Central	38	62	62	34	43	63	5,225	4,496	3,225
South Atlantic	95	140	171	895	972	977	4,283	17,982	6,366
East South Central	41	61	71	140	167	167	756	4,771	1,429
West South Central	106	86	137	884	1,830	705	2,380	4,554	2,637
Mountain	41	71	61	376	329	221	5,010	2,992	2,671
Pacific	53	51	105	213	2,082	309	19,639	2,698	3,383
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	288	152	152	97	105	164	7,303	10,056	12,685
New England	29	14	10	6	3	2	974	905	905
Middle Atlantic	103	41	54	13	14	10	2,098	3,634	3,802
East North Central	11	21	21	9	12	12	2,241	3,041	3,904
West North Central	17	7	7	11	4	4	700	678	808
South Atlantic	56	25	25	15	27	16	438	552	518
East South Central	22	12	15	11	10	10	244	449	219
West South Central	20	19	14	16	10	10	169	153	172
Mountain	5	1	4	6	1	2	192	192	321
Pacific	25	12	12	10	24	24	447	452	654
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	105	144	839	457	513	804	15,027	19,798	[3] 16,058
New England	0	0	0	13	25	20	1,750	1,629	1,295
Middle Atlantic	0	0	0	62	90	59	4,015	3,011	3,257
East North Central	48	51	166	42	47	87	3,502	3,494	3,391
West North Central	9	43	331	29	31	40	475	1,379	872
South Atlantic	4	1	4	128	125	179	1,808	2,931	2,545
East South Central	8	20	23	42	47	87	771	789	705
West South Central	25	19	41	116	101	167	817	1,581	1,700
Mountain	7	4	39	8	15	26	495	1,400	1,012
Pacific	4	6	103	17	32	52	1,394	3,584	2,421

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.
[3] Four-year (1938–41) average.

DEATHS DURING WEEK ENDED JUNE 27, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 27, 1942	Corresponding week 1941
Data from 87 large cities of the United States:		
Total deaths	7,734	8,583
Average for 3 prior years	7,809	
Total deaths, first 25 weeks of year	216,956	220,897
Deaths per 1,000 population, first 25 weeks of year, annual rate	12.2	12.4
Deaths under 1 year of age	489	548
Average for 3 prior years	511	
Deaths under 1 year of age, first 25 weeks of year	13,977	13,047
Data from industrial insurance companies:		
Policies in force	64,967,453	64,419,021
Number of death claims	10,607	11,150
Death claims per 1,000 policies in force, annual rate	8.5	9.0
Death claims per 1,000 policies, first 25 weeks of year, annual rate	9.7	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 4, 1942

Summary

The number of reported cases of poliomyelitis increased from 41 to 55 during the current week. The current incidence, however, is not only below the 5-year (1937–41) median expectancy of 80, but is below the incidence for the corresponding week of any other year since 1938. For the same week in 1937, a total of 158 cases was reported. Currently, Arkansas reported 12 cases (3 last week), and Kentucky and Tennessee, 6 cases each (0 and 2, respectively, last week).

The number of cases of meningococcus meningitis declined from 112 to 53. Both the current incidence and the cumulative cases to date are above the figures for the corresponding periods of any other prior year since 1937.

The incidence of both smallpox and typhoid fever continues below that for any prior year.

Of the 9 common communicable diseases included in the following weekly table, the incidence of only measles and meningococcus meningitis was above the 5-year median expectancy for the first half of the current year. Of a total of 41 cases of anthrax reported during the first 6 months of this year, 25 cases occurred in Pennsylvania; of 3,199 cases of bacillary dysentery, 2,342 occurred in Texas; and of 1,825 cases of unspecified dysentery, 1,134 were reported in Virginia. During the same period, several cases of psittacosis of nonpsittacine origin were reported in New York, in which the disease was believed to have been contracted from pigeons.

The death rate for the current week for 88 large cities in the United States is 10.7 per 1,000 population, as compared with 10.8 for the preceding week and with a 3-year (1939–41) average of 10.3.

Telegraphic morbidity reports from State health officers for the week ended July 4, 1942, and comparison with corresponding week of 1941 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941	
NEW ENG.												
Maine	0	0	0				95	59	59	1	0	0
New Hampshire	0	0	0				27	0	13	0	0	0
Vermont	0	0	0				55	61	56	0	0	0
Massachusetts	0	0	0				444	553	504	1	0	0
Rhode Island	0	0	0				53	1	37	0	0	0
Connecticut	0	0	1		2	1	141	240	45	2	0	0
MID. ATL.												
New York	14	8	10	[1] 3	[1] 3	[1] 3	611	985	894	9	4	4
New Jersey	2	1	4	5		1	305	360	258	2	0	0
Pennsylvania	7	6	9				230	1,294	927	3	2	4
E. NO. CEN.												
Ohio	7	3	20	1	5	7	90	651	540	1	1	2
Indiana	4	4	6	4	2	2	37	99	44	0	0	0
Illinois	19	7	20	3	1	5	70	236	182	0	1	1
Michigan [2]	3	0	5		1		237	406	230	1	0	0
Wisconsin	1	0	1	12	9	9	789	735	643	0	0	0
W. NO. CEN.												
Minnesota	4	1	1		1	1	66	11	27	1	0	0
Iowa	1	1	2				51	69	69	0	0	0
Missouri	1	1	1		2		31	150	18	1	0	0
North Dakota	0	0	0	1	13		9	12	9	0	1	0
South Dakota	0	10	3				2	5	3	0	0	0
Nebraska	1	0	1	2			32	16	11	1	0	1
Kansas	0	5	3		15	1	35	60	60	1	1	0
SO. ATL.												
Delaware	0	0	0				4	14	3	0	0	0
Maryland [2]	1	5	5	3			65	314	47	3	6	1
Dist. of Col.	0	1	2				24	60	42	0	1	0
Virginia	3	4	4	42	69	14	59	311	115	2	1	1
West Virginia	2	3	4			6	27	203	30	0	2	1
North Carolina	4	3	4	1			66	237	174	0	0	0
South Carolina	1	1	2	37	74	83	34	192	18	0	1	0
Georgia	5	9	4	3	5	5	25	102	16	1	0	0
Florida	1	1	1		10		22	12	12	2	1	0
E. SO. CEN.												
Kentucky	5	0	1	1		1	14	44	56	3	1	1
Tennessee	2	1	3	5	11	4	35	84	32	0	0	0
Alabama	6	2	3	3		5	15	27	47	0	1	1
Mississippi [2]	2	7	4							0	0	0
W. SO. CEN.												
Arkansas	4	2	2	1	6	6	28	71	12	0	0	0
Louisiana	1	1	4	1	1	7	15	3	3	1	1	1
Oklahoma	0	3	4	11	11	10	39	74	30	0	0	0
Texas	1	10	11	135	289	76	99	145	145	6	2	1
MOUNTAIN												
Montana	4	3	1				35	7	31	1	0	0
Idaho	0	1	0			1	7	7	7	0	0	0
Wyoming	0	0	0	56			22	6	6	0	1	0
Colorado	7	4	13	9	12	1	61	54	48	0	0	0
New Mexico	1	2	1		1	1	11	48	23	0	0	0
Arizona	1	0	2	9	35	18	25	77	14	0	0	0
Utah [2]	0	1	0	1	2		283	9	58	0	0	0
Nevada	0	0					23	3		0	0	
PACIFIC												
Washington	4	3	1	3			729	15	63	0	0	0
Oregon	2	1	3	3	9	10	46	21	40	0	0	0
California	5	5	16	15	30	14	1,110	167	167	9	2	2
Total	126	120	245	370	619	358	6,333	8,310	6,225	52	30	34
26 weeks	6,304	6,399	10,227	78,126	160,393	157,354	450,664	501,933	534,515	2,019	1,210	1,210

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 4, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941		July 4, 1942	July 5, 1941	
NEW ENG.												
Maine	0	0	0	7	3	9	0	0	0	0	2	2
New Hampshire	0	0	0	2	0	0	0	0	0	0	0	0
Vermont	0	0	0	1	0	3	0	0	0	0	0	0
Massachusetts	1	0	1	124	65	65	0	0	0	4	3	2
Rhode Island	0	0	0	5	2	5	0	0	0	1	0	0
Connecticut	0	0	0	11	12	20	0	0	0	1	0	0
MID. ATL.												
New York	1	3	2	108	140	170	0	0	0	2	5	6
New Jersey	0	1	0	37	32	57	0	0	0	2	2	2
Pennsylvania	1	4	1	85	76	100	0	0	0	10	7	13
E. NO. CEN.												
Ohio	1	1	1	86	113	116	5	0	1	16	7	8
Indiana	1	0	0	14	13	17	0	0	7	0	2	2
Illinois	4	5	2	62	65	133	2	4	14	2	14	9
Michigan [1]	3	0	1	85	98	126	0	2	0	0	6	3
Wisconsin	0	0	0	60	34	50	0	2	2	0	0	0
W. NO. CEN.												
Minnesota	0	2	0	22	15	27	0	2	3	2	0	0
Iowa	0	0	0	10	9	15	0	0	12	0	3	3
Missouri	1	0	0	12	0	16	1	0	10	5	7	7
North Dakota	1	0	0	3	4	4	0	0	0	1	0	0
South Dakota	0	0	0	3	4	5	0	0	4	1	0	0
Nebraska	0	0	0	4	7	8	0	0	0	0	0	0
Kansas	0	0	0	18	15	21	0	0	1	1	3	3
SO. ATL.												
Delaware	0	0	0	8	4	3	0	0	0	1	0	2
Maryland [1]	0	0	0	29	27	14	0	0	0	7	6	3
Dist. of Col.	0	0	0	1	3	4	0	0	0	0	0	0
Virginia	1	0	1	10	5	4	0	0	0	4	3	7
West Virginia	0	0	0	7	7	12	0	0	0	1	2	6
North Carolina	0	1	2	6	9	14	0	0	0	4	9	9
South Carolina	2	3	1	6	1	1	0	0	0	7	5	16
Georgia	1	19	4	7	3	9	1	0	0	16	20	25
Florida	1	6	1	1	1	1	0	0	0	6	2	2
E. SO. CEN.												
Kentucky	6	2	2	21	25	15	0	0	0	8	13	13
Tennessee	6	0	1	19	14	11	0	1	1	11	10	11
Alabama	1	22	2	7	5	7	0	0	0	2	5	7
Mississippi [1]	2	6	3	4	2	2	0	0	0	3	11	11
W. SO. CEN.												
Arkansas	12	0	0	2	0	2	0	0	0	8	8	13
Louisiana	2	0	0	4	1	5	1	0	0	12	9	19
Oklahoma	0	0	1	4	9	9	0	3	3	1	9	10
Texas	1	8	8	15	12	20	2	0	2	13	43	35
MOUNTAIN												
Montana	0	0	0	8	10	9	0	0	1	0	1	1
Idaho	0	0	0	0	1	2	1	0	0	1	0	2
Wyoming	0	0	0	12	0	6	1	0	0	0	1	0
Colorado	0	0	0	1	8	10	0	0	0	0	2	2
New Mexico	0	0	0	1	1	5	0	0	0	7	5	5
Arizona	3	0	0	2	1	2	0	2	2	1	1	2
Utah [1]	0	0	0	5	0	6	0	0	0	0	0	0
Nevada	0	0	----	0	0	----	0	0	----	0	0	----
PACIFIC												
Washington	0	0	0	8	7	11	0	0	1	0	0	1
Oregon	0	0	0	4	5	9	0	3	3	1	0	1
California	2	3	7	61	35	93	0	0	7	4	6	6
Total	54	86	80	1,012	903	1,277	14	19	109	166	232	305
26 weeks	609	757	784	84,293	85,044	110,798	568	1,093	7,370	2,378	2,654	3,791

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 4, 1942—Continued

Division and State	Whooping cough		Week ended July 4, 1942								
	Week ended—		Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	July 4, 1942	July 5, 1941		Amebic	Bacillary	Unspecified					
NEW ENG.											
Maine	21	25	1	0	0	0	0	0	0	0	0
New Hampshire	0	1	0	0	0	0	0	0	0	0	0
Vermont	38	0	0	0	0	0	0	0	0	0	0
Massachusetts	180	101	0	0	0	0	1	0	0	0	0
Rhode Island	43	18	0	0	0	0	0	0	0	0	0
Connecticut	58	42	0	0	1	0	0	0	0	0	0
MID. ATL.											
New York	379	226	0	2	32	0	3	0	0	0	0
New Jersey	246	53	0	2	0	0	0	0	0	0	0
Pennsylvania	237	314	0	0	0	0	0	0	0	0	0
E. NO. CEN.											
Ohio	177	346	0	0	0	0	0	0	0	0	0
Indiana	38	9	0	0	0	0	0	0	0	0	0
Illinois	334	75	0	0	1	0	0	0	0	2	0
Michigan [2]	122	223	0	0	5	0	0	0	0	0	0
Wisconsin	248	103	0	0	0	0	0	0	0	0	0
W. NO. CEN.											
Minnesota	34	63	0	0	0	0	1	0	0	0	0
Iowa	27	47	0	0	0	0	1	0	0	0	0
Missouri	11	0	0	0	0	0	0	0	0	2	0
North Dakota	0	28	0	0	0	0	0	0	0	0	0
South Dakota	0	7	0	0	0	0	0	0	1	0	0
Nebraska	7	17	0	0	0	0	0	0	0	0	0
Kansas	54	149	0	0	0	0	0	0	0	0	0
SO. ATL.											
Delaware	1	2	0	0	0	0	0	0	1	0	0
Maryland [2]	55	84	0	0	0	1	0	0	4	0	0
District of Columbia	22	9	0	0	0	0	0	0	0	0	0
Virginia	46	112	0	0	0	262	0	0	3	0	0
West Virginia	8	36	0	0	0	0	0	0	0	0	0
North Carolina	108	185	0	0	0	0	0	0	1	0	1
South Carolina	46	91	0	0	0	0	0	0	0	0	3
Georgia	45	15	0	0	23	0	0	0	0	0	16
Florida	4	8	0	0	0	0	0	0	1	1	2
E. SO. CEN.											
Kentucky	46	45	0	0	2	0	0	0	0	1	0
Tennessee	71	43	0	0	0	14	0	0	0	2	1
Alabama	31	14	0	0	0	0	0	0	0	0	6
Mississippi [2]	----	----	0	0	0	0	0	0	0	2	1
W. SO. CEN.											
Arkansas	19	22	0	3	63	0	0	0	0	3	0
Louisiana	0	12	1	0	0	0	0	0	0	0	0
Oklahoma	14	25	0	0	0	0	0	0	0	0	0
Texas	137	250	0	16	219	0	0	0	0	0	21
MOUNTAIN											
Montana	13	14	0	0	0	0	0	0	1	0	0
Idaho	3	10	0	0	0	0	0	0	0	0	0
Wyoming	7	0	0	0	0	0	0	0	0	1	0
Colorado	24	98	0	0	0	0	0	0	0	1	0
New Mexico	17	42	0	0	1	0	0	0	0	0	0
Arizona	23	31	0	0	0	31	0	0	0	0	0
Utah [2]	31	28	0	0	0	0	0	0	1	0	0
Nevada	4	12	0	0	0	0	0	0	2	0	0
PACIFIC											
Washington	62	52	0	0	1	0	0	0	0	0	0
Oregon	20	26	0	0	0	0	0	0	1	0	0
California	126	318	0	2	4	0	0	0	0	0	1
Total	3,237	3,431	2	25	352	308	6	0	16	15	52
26 weeks	98,514	119,860	----	----	----	----	----	----	----	----	----

[1] New York City only.
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 20, 1942

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga.	0	0	6	0	1	0	2	0	3	0	0	8
Baltimore, Md.	2	0	1	0	52	2	4	0	8	0	0	54
Barre, Vt.	0	0	------	0	2	0	0	0	0	0	0	8
Billings, Mont.	0	0	------	0	12	0	0	0	0	0	0	2
Birmingham, Ala.	0	0	2	2	0	0	4	0	1	0	0	1
Boise, Idaho	0	0	------	0	0	0	0	0	0	0	0	0
Boston, Mass.	0	0	------	0	210	0	8	0	32	0	0	50
Bridgeport, Conn.	0	0	------	0	5	0	0	0	1	0	0	1
Brunswick, Ga.	0	0	------	0	0	0	1	0	0	0	0	0
Buffalo, N. Y.	0	0	------	0	12	1	2	0	2	0	0	1
Camden, N. J.	0	0	------	0	2	0	0	0	5	0	0	2
Charleston, S. C.	2	0	2	0	8	0	3	0	0	0	1	1
Charleston, W. Va.												
Chicago, Ill.	19	0	3	0	23	1	16	0	42	1	3	130
Cincinnati, Ohio	0	0	1	0	3	0	2	0	12	0	0	8
Cleveland, Ohio	1	0	10	0	4	1	5	0	25	0	0	32
Columbus, Ohio	1	0	------	0	20	0	1	0	9	0	1	11
Concord, N. H.	0	0	------	0	2	0	0	0	0	0	0	0
Cumberland, Md.	0	0	------	0	0	0	0	0	0	0	0	0
Dallas, Tex.	1	0	------	0	3	0	0	0	4	0	0	4
Denver, Colo.	11	0	4	1	64	0	2	0	2	0	0	8
Detroit, Mich.	3	0	1	1	32	0	12	0	65	0	0	80
Duluth, Minn.	0	0	------	0	5	0	0	2	2	0	0	3
Fall River, Mass.	1	0	------	0	19	0	0	0	11	0	0	4
Fargo, N. Dak.	1	0	------	0	2	0	0	0	0	0	0	0
Flint, Mich.	0	0	------	0	1	0	1	0	4	0	0	4
Fort Wayne, Ind.	0	0	------	0	0	0	2	0	1	0	0	3
Frederick, Md.	0	0	------	0	0	0	0	0	0	0	0	0
Galveston, Tex.	0	0	------	0	1	0	1	0	0	0	0	7
Grand Rapids, Mich.	0	1	------	0	1	0	1	0	0	0	0	4
Great Falls, Mont.	0	0	------	0	10	0	1	0	0	0	0	1
Hartford, Conn.	0	0	------	0	41	0	2	0	2	0	0	13
Helena, Mont.	0	0	------	0	2	0	0	1	0	0	0	0
Houston, Tex.	0	0	------	0	9	0	5	0	1	0	2	1
Indianapolis, Ind.	0	0	------	1	32	0	4	0	5	0	0	11
Kansas City, Mo.	0	0	------	0	20	0	2	0	9	0	0	0
Kenosha, Wis.	0	0	------	0	10	0	0	0	0	0	0	12
Little Rock, Ark.	0	0	------	0	0	0	0	0	0	0	0	2
Los Angeles, Calif.	3	0	6	0	219	1	6	0	9	0	0	21
Lynchburg, Va.	1	0	------	0	0	0	0	0	0	0	0	13
Memphis, Tenn.	0	0	------	0	18	0	4	0	0	1	0	11
Milwaukee, Wis.	0	0	------	0	463	0	3	0	8	0	0	25
Minneapolis, Minn.	0	0	------	0	59	0	1	0	5	1	0	3
Missoula, Mont.	0	0	------	0	1	1	1	0	0	0	0	0
Mobile, Ala.	0	0	------	0	0	0	1	0	0	0	3	0
Nashville, Tenn.	0	0	------	0	4	0	1	0	0	0	0	3
Newark, N. J.	0	0	2	0	122	3	4	0	7	0	0	44
New Haven, Conn.	0	0	------	0	22	0	0	0	3	0	0	7
New Orleans, La.	2	0	2	2	17	0	10	1	1	0	2	5
New York, N. Y.	14	0	------	0	102	10	39	1	74	0	0	188
Omaha, Nebr.	0	0	------	0	20	0	1	0	1	0	0	0
Philadelphia, Pa.	1	0	3	0	31	3	9	0	66	0	0	86
Pittsburgh, Pa.	1	0	------	0	11	0	1	0	2	0	0	15
Portland, Maine.	0	0	------	0	32	0	2	0	5	0	0	2
Providence, R. I.	3	0	------	0	102	1	1	0	2	0	1	17
Pueblo, Colo.	0	0	------	0	1	0	0	0	2	0	0	2
Racine, Wis.	0	0	------	0	92	0	0	0	6	0	0	12
Raleigh, N. C.												
Reading, Pa.	0	0	------	1	0	0	0	0	0	0	1	8
Richmond, Va.	0	0	------	0	6	0	1	0	1	0	0	4

City reports for week ended June 20, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0	------	0	0	0	0	0	0	0	0	0
Rochester, N. Y	0	0	------	0	19	0	0	0	1	0	1	12
Sacramento, Calif	0	0	------	0	9	0	0	0	3	0	0	6
Saint Joseph, Mo	0	0	------	0	0	0	1	0	1	0	0	1
Saint Louis, Mo	0	0	------	0	10	2	6	1	5	0	2	4
Saint Paul, Minn	0	0	------	0	48	0	2	0	1	0	0	8
Salt Lake City, Utah	0	0	------	0	317	0	4	2	0	0	0	5
San Antonio, Tex	0	0	------	0	7	0	5	0	0	0	0	2
San Francisco, Calif	0	0	1	0	973	0	5	0	11	0	0	13
Savannah, Ga	0	0	------	0	3	0	0	0	0	0	0	2
Seattle, Wash	1	0	------	0	298	0	4	0	3	0	0	14
Shreveport, La	0	0	------	0	0	0	2	1	0	0	0	0
South Bend, Ind	0	0	------	0	1	0	0	0	0	0	0	0
Spokane, Wash	1	0	------	0	105	0	0	0	3	0	0	1
Springfield, Ill	0	0	------	0	6	0	1	0	0	0	0	0
Springfield, Mass	0	0	------	0	52	0	2	0	8	0	0	5
Superior, Wis	0	0	------	0	1	0	0	0	0	0	0	1
Syracuse, N. Y	0	0	------	0	453	0	3	0	3	0	2	38
Tacoma, Wash	0	0	------	0	30	0	2	0	3	0	0	0
Tampa, Fla	0	0	------	0	10	0	1	0	0	0	0	0
Terre Haute, Ind	0	0	------	0	2	0	2	0	1	0	0	0
Topeka, Kans	0	0	------	0	1	0	0	0	1	0	0	1
Trenton, N. J	0	0	------	0	1	0	1	0	6	0	0	1
Washington, D. C	1	0	------	0	47	0	7	0	2	0	1	17
Wheeling, W. Va	0	0	------	0	4	0	1	0	0	0	0	1
Wichita, Kans	0	0	------	0	15	0	2	1	2	0	0	4
Wilmington, Del	0	0	------	0	3	0	2	0	0	0	0	1
Wilmington, N. C	0	0	------	0	0	0	0	0	0	0	0	21
Winston-Salem, N. C	0	0	------	0	0	0	0	0	1	0	0	1
Worcester, Mass	0	0	------	0	0	0	6	0	13	0	1	83

(11862)

Anthrax.—Cases: Camden, 1; Philadelphia, 1; Shreveport, 1.
Dysentery, bacillary.—Cases: Baltimore, 1; Los Angeles, 4; New Orleans, 1; St. Louis, 2.
Rocky Mountain spotted fever.—Cases: Washington, 1.
Tularemia.—Cases: New Orleans, 1.
Typhus fever.—Cases: Atlanta, 2; Charleston, S. C., 1; New Orleans, 1; Savannah, 2; Terre Haute, 1.

Rates (annual basis) per 100,000 population, for the group of 88 cities in the preceding table (estimated population, 1942, 34,015,555)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended June 20, 1942	10.73	6.74	1.23	666.05	34.49	77.57	0.46	3.22	179.66
Average for week, 1937–41	13.17	5.27	2.48	[1]544.65	46.63	146.54	1.55	4.80	188.21

[1] Median.

PLAGUE INFECTION IN CALIFORNIA AND OREGON

Plague infection has been reported in California and Oregon as follows:

CALIFORNIA

Lassen County: April 15, in fleas from ground squirrels, *C. beecheyi*, as follows: in a pool of 44 fleas from 2 ground squirrels collected approximately 9½ miles northwest of Doyle, a pool of 133 fleas from 3 ground squirrels taken 6 miles northwest of Milford, a third pool of 47 fleas from 3 ground squirrels taken at Doyle, and a pool of 200 fleas from 12 ground squirrels taken 4 miles northwest of Doyle; April 16, in a pool of 18 fleas from 1 ground squirrel, *C. beldingi*, taken 8 miles northwest of Doyle; April 20, in a pool of 125 fleas from 12 ground squirrels (*C. beecheyi*) taken 1½ miles south of Milford; April 21, in a pool of 23 fleas from 1 ground squirrel of same species, taken 3 miles northwest of Doyle; June 3, in tissue from 1 ground squirrel, *C. beldingi*, taken 17½ miles south and 28 miles east of Susanville.

Monterey County: June 3, in a pool of 186 fleas from 17 ground squirrels (*C. beecheyi*) taken 12 miles southwest of Salinas (Fort Ord).

San Luis Obispo County: May 27, in organs from a gopher taken 12 miles east and 13 miles south of Arroyo Grande (Alamo Creek); June 3 and 4, respectively, in organs from 13 and from 6 ground squirrels (*C. beecheyi*) collected 2½ miles north and 8 miles east of Santa Maria; June 10, in organs from a ground squirrel of the same species, 8 weeks old, taken 13 miles south of Arroyo Grande.

Siskiyou County: In fleas from ground squirrels (*C. douglasii*), as follows: May 27, in a pool of 24 fleas from 5 ground squirrels taken 8 miles east and 2 miles south of Montague, and, May 29, in a pool of 31 fleas from 2 ground squirrels, taken 1 mile farther south; May 28, in a pool of 88 fleas from 4 ground squirrels taken 5 miles east of Montague, and in a pool of 43 fleas from 6 ground squirrels taken 4 miles east and 1 mile north of Yreka.

OREGON

Grant County: May 25, in tissue from 1 ground squirrel (*C. oregonus*) taken 4 miles southwest of Mt. Vernon; May 27, in a pool of 41 fleas and 60 lice from 90 ground squirrels, same species, taken 3 miles south of Beech Creek; May 31, in a pool of 197 fleas and 41 lice from 7 marmots (*M. flaviventris*), taken on Laycock Road, 2 to 5 miles south of Mt. Vernon.

Malheur County: June 6, in a pool of 79 fleas from 5 marmots (*M. flaviventris*) taken 1 to 5 miles east of Jordan Valley; June 8, in a pool of 48 fleas from 6 marmots (same species) taken on Arock Road, 2 to 6 miles south of Danner; June 10, in a pool of 7 fleas from 27 ground squirrels (*C. oregonus*), collected 1 to 5 miles west of Jordan Valley, Highway No. 95.

TERRITORIES AND POSSESSIONS

Virgin Islands of the United States

Notifiable diseases—January–March 1942.—During the months of January, February, and March 1942, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	January	February	March
Chickenpox	2	6	6
Dengue		6	
Dysentary (bacillary)			2
Filariasis	6	5	6
German measles	2	4	30
Gonorrhea	26	23	38
Hookworm disease	1	2	1
Lymphogranuloma venereum		1	
Malaria	4	1	2
Mumps	3	125	60
Pellagra		1	
Pneumonia	1		
Syphilis	33	22	43
Tetanus		1	
Tuberculosis	1	2	3

FOREIGN REPORTS

AZORES

St. Michel—Cerebrospinal meningitis.—During the period March 1 to May 16, 1942, 425 cases of cerebrospinal meningitis with 71 deaths were reported in St. Michel, Azores. The numbers of cases and deaths reported by weeks are as follows:

Week ended (1942)—	Cases	Deaths	Week ended (1942)—	Cases	Deaths
March 7	29	8	April 18	42	8
March 14	26	8	April 25	53	11
March 21	43	6	May 2	43	6
March 28	39	3	May 9	52	7
April 4	34	6	May 16	19	3
April 11	45	5			

CANADA

Provinces—Communicable diseases—Week ended June 6, 1942.—During the week ended June 6, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1	4	1	5				1	12
Chickenpox		6	2	178	320	38	18	67	62	691
Diphtheria		8	5	24	1	2	1		2	43
Dysentery	4			7	1					12
German measles		1		12	46	18	10	36	18	141
Influenza	6	6					3		5	20
Lethargic encephalitis						1				1
Measles		2	6	348	275	95	25	6	37	794
Mumps	3	23	8	141	433	36	112	42	218	1,016
Pneumonia	4	6			8	3			1	22
Poliomyelitis			2			1	1			4
Scarlet fever		10	24	98	183	31	24	77	17	464
Tuberculosis	4	6	14	92	39		1	1		157
Typhoid and paratyphoid fever			1	8	1	1	1		1	13
Undulant fever				1	1					2
Whooping cough		2		236	45	7	6	13	19	328
Other communicable diseases	2	7		5	238	31		1	14	298

CUBA

Provinces—Notifiable diseases—4 weeks ended May 23, 1942.—During the 4 weeks ended May 23, 1942, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		6	10	1	10	28
Chickenpox				1	5	1	7
Diphtheria	1	21	3	3	1	2	31
Leprosy				1		2	3
Malaria	81	16		5	2	310	414
Measles		29		1	1	3	34
Poliomyelitis	1	4		2		3	10
Rabies		1					1
Tuberculosis	13	36	20	25	21	58	173
Typhoid fever	8	78	6	67	21	30	210
Undulant fever				1			1
Yaws						1	1

[1] Includes the city of Habana.

FINLAND

Communicable diseases—March 1942.—During the month of March 1942, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	129	Paratyphoid fever	75
Dysentery	7	Scarlet fever	497
Influenza	1,914	Typhoid fever	74

JAMAICA

Notifiable diseases—4 weeks ended May 9, 1942.—During the 4 weeks ended May 9, 1942, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	18	11	Puerperal fever		1
Diphtheria		2	Tuberculosis	32	62
Dysentery		1	Typhoid fever	6	23
Leprosy		3	Typhus fever	6	2
Poliomyelitis		1			

NOTE.—No report was received for the week ended May 2.

MALTA

Notifiable diseases—March 1942.—During the month of March 1942, certain notifiable diseases were reported in Malta including the island of Gozo as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cancer		13	Pneumonia	154	32
Cerebrospinal meningitis	5		Scarlet fever	2	
Diabetes mellitus		28	Trachoma	8	
Diphtheria	14	3	Tuberculosis (pulmonary)	34	23
Gastroenteritis		34	Typhoid fever	8	1
Influenza	133		Undulant fever	17	2
Measles	2		Whooping cough	40	3

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Port Said.—During the period June 11–17, 1942, one case of bubonic plague was reported in Port Said, Egypt.

Peru—Lima.—According to information dated June 12, 1942, an outbreak of plague has been reported in Lima, Peru, where, from the latter part of April to June 12, 1942, 13 cases with 4 deaths have occurred.

Typhus Fever

Hungary.—For the week ended June 13, 1942, 22 cases of typhus fever were reported in Hungary.

Iraq.—During the week ended May 23, 1942, 18 cases of typhus fever were reported in Iraq.

Irish Free State—Mayo County—Westport.—During the week ended May 30, 1942, 1 case of typhus fever was reported in Westport, Mayo County, Irish Free State.

Morocco.—During the week ended June 13, 1942, 832 cases of typhus fever were reported in Morocco.

Rumania.—For the week ended June 20, 1942, 52 cases of typhus fever were reported in Rumania.

Spain.—For the week ended May 30, 1942, 20 cases of typhus fever were reported in Spain.

Tunisia.—During the period June 1–10, 1942, 725 cases of typhus fever were reported in Tunisia.

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COUPT DECISION ON PUBLIC HEALTH

State superintendent of public health—amount of annual salary—applicable statutes construed.—(Arizona Supreme Court; *Manning* v. *Frohmiller, State Auditor*, 120 P.2d 416; decided Dec. 29, 1941.) The Arizona statutes provided that the State superintendent of public

health should receive a salary, to be fixed by the State board of health within the limits of funds available therefor, of not less than $4,800 per annum. They also provided that the public health fund should consist of appropriations and of all receipts from any other source for the use of the State department of public health and that the salaries and expenses of the department should be paid from such fund. An appropriation law appropriated the sum of $3,600 for each of 2 fiscal years for the salary of the superintendent. The board of health, acting under the express authority from the legislature, fixed the salary of the superintendent at $5,100 per year.

In a mandamus proceeding the petitioner sought to compel the State auditor to approve warrants for his salary as superintendent in the full amount of the salary fixed by the board of health. The auditor's position was that she was limited in her payment of the petitioner's salary to the amount specifically appropriated for that purpose, namely, $3,600 per year. Pointing out that the statute did not limit the salary of the superintendent as fixed by the board to the amount appropriated by the legislature for that purpose but to the "funds available therefor," that the public health fund consisted not only of appropriations by the legislature but also of any receipts from other sources, and that the salaries of the department were to be paid from such fund, the Supreme Court of Arizona said that it thought that the reasonable construction of the law was that the petitioner was entitled to have his salary warrants approved for the full amount of $5,100 per year since there was in the public health fund an amount sufficient to pay the salary as fixed by the board of health.

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